Five Years of Experience

with leveling of the Tibial Plateau for Cranial Cruciate Ligament Rupture in the Dog.

- by Alex Walker

The old adage that you can tell the relative success of a surgical procedure by the number of techniques described to treat the problem is a truth. Total hip replacement was first described in the early 1960's and there are still only 2 basic techniques - cemented or non-cemented. On the other hand, surgery to treat rupture of the cranial cruciate ligament (CCL) has had a plethora of techniques including intracapsular, extracapsular (each using a myriad of implants and fixation), fibula head transposition, capsulorrhapy and now tibial osteotomies. I have done my time with them all.

Over ten years ago, Dr Barclay Slocum changed the way we think about stifle biomechanics. Previously, stifle stability and range of motion was thought to be controlled by ligaments with the CCL preventing internal rotation, hyperextension and cranial displacement of the tibia relative to the femoral condyles. Slocum described a model where the forces of weight bearing, thigh musculature and ligaments affect stifle stability. Slocum recognized the existence of "cranial tibial thrust" (when a force is created across the stifle joint the tibia wants to displace cranially), which is resisted primarily by the CCL. This force varies with weight bearing and the degree of a "tibial slope". The tibial slope varies between individuals and the degree of compression varies with weight and activity. He postulated that by reducing the tibial slope the cranial tibial thrust is also reduced eventually reaching a point where no cranial thrust is created on weight bearing. He designed a technique called "tibial plateau leveling osteotomy" or TPLO (Figure 1.). He patented this technique requiring veterinarians to attend his certified TPLO workshops before gaining the right to perform the procedure. This requirement plus the need for specialized instrumentation and implants slowed the uptake of the technique. This led to other techniques being developed to alter the tibial slope. In 2000 we started performing a modification of a technique developed at the University of Zurich by Dr Pierre Montavon, which we have called the proximal tibial intra-articular wedge ostectomy (PTIO) (Figure 2). To assess our results we designed a prospective study that followed 60 stifles for 12 months after surgery. We assessed complications, lameness scores, thigh muscle circumference, range of motion, progression of DJD and surgeon and owner assessment of limb function preoperatively and then at 6 and 12 months. Results showed rapid return of thigh musculature, no loss of stifle range of motion, slow progression of osteoarthritis over the 12 months and excellent limb function in 90% of the patients. Most patients were large breeds (mean weight 39kg) and 58% had bilateral cranial cruciate ruptures. The study has since been published in *Veterinary Surgery.*

Figure 1

Figure 2

Despite the success of this technique we have recently changed to the Slocum TPLO because this technique is the global "gold standard" and is actively being researched around the world. Over the last 5 years we have become firm advocates (from curious sceptics) of the TPLO technique for large and active dogs. The technique is technically challenging with a steep learning curve and the potential for complications that demand astute clinical decisions. As surgeons, we have advanced our understanding of stifle biomechanics and, although not the Holy Grail, TPLO does give us confidence that we can achieve normal or near normal function in most dogs with CCL rupture. The benefits are a more rapid return to exercise (without the anxiety of prosthesis breakage/loosening), maintenance of range of motion, ability to treat large dogs with good results and excellent limb function even after heavy exercise.